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March 18, 2014

Mr. Ernie Steinauer, Chair  
Nantucket Conservation Commission  
Town of Nantucket  
Nantucket, MA 02554

Re: Request for Certification of Emergency:  
Sconset Bluff – Baxter Road

Dear Chairman Steinauer:

On behalf of the Siasconset Beach Preservation Fund, Inc. (SBPF), this letter constitutes a request by SBPF for permission to perform an Emergency Project, and for certification of that project as an emergency under 310 CMR 10.06 and §136-5 of the Nantucket Town Code. However, please let me note that SBPF is anxious to work cooperatively with the Commission to the maximum extent possible. While this emergency certification is appropriate and the proposed work is necessary, and the Emergency Certification process is the only means available to address this urgent situation, please be aware that if the Commission objects, SBPF will withdraw this request, and will not appeal an adverse decision.

The work proposed under the Emergency Project is to plant native species, initially American Beach Grass, on the face of the bluff, along 87-105 Baxter Road, above the now installed geotube, leaving an area at the very top for swallow habitat, if desired by the Commission (see January 27, 2014 as-built). The planting would be done in a bed of beach compatible sand from local sources, as previously approved for use on the Sconset Bluff, and the sand and planting would be protected from initial wind, rain, and storm water runoff through the use of a biodegradable netting, as is consistent with other Conservation Commission approved planting on Nantucket. The Emergency Project is also consistent with the vegetation concurrently proposed for the Baxter Road Temporary Stabilization Project (DEP File No. 048-2610), described in detail during that NOI process. No other work is proposed as an emergency and no other aspect of the NOI is proposed to be an emergency.

**READE, GULLICKSEN,**

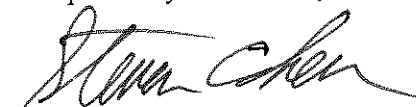
**HANLEY, GIFFORD & COHEN, LLP**

This situation qualifies as an emergency because, as Town of Nantucket, the Nantucket Conservation Commission and the state Department of Environmental Protection have noted, a failure of the access and utilities to the homes on either side of Baxter Road would be a threat to public health and safety, and this threat remains imminent. In this case, the top of the bluff is nearly at the emergency demarcation line that the Town has staked along the road, so there is very little room for further loss. Although the new geotube system protects the toe of the bluff, the face of the bluff is in a state that is entirely unprotected and that increases erosion because of the lack of its natural vegetation. As provided in the Haley and Aldrich Memorandum of March 12, 2014, the proposed Emergency Project would help address surface water runoff, would promote water infiltration and would naturally stabilize the bluff face, all with no negative impacts. As you will recall, this planting was only removed from the prior Emergency Certification because it could not have been done at that time of year. However, if the planting is not done by mid-April, it cannot be done in a way that would provide the most effective protection for the 2014/15 season. Although the same work is being concurrently proposed through the NOI process for the Baxter Road Temporary Stabilization Project, by the time that NOI is thoroughly reviewed, an Order of Conditions is issued and the appeal period has run, the mid-April planting window will have closed.

The proposed Emergency Project will protect Baxter Road, a public way, and the associated utilities, some or all of which constitute pre-1978 structures or infrastructure, and the residences on Baxter Road in the Emergency Project area, both seaward and landward of the road, most of which were constructed prior to 1978 (as previously presented to the Commission in the NOI materials). Accordingly, the Emergency Project is within the scope of work that "shall be permitted" under 310 CMR 10.30 and within the scope of parallel provisions of the Nantucket Wetlands Regulations. Further, the proposed Emergency Project is not more than necessary to abate the threat to public safety from storm damage to buildings, Baxter Road and water infrastructure, and in fact will have the added benefits of improving wetland scenic views and wildlife habitats right away. The harm that may result from failing to certify the emergency and to permit the Emergency Project to go forward far outweighs any burdens associated with the proposed work.

That said, please be advised that SBPF files this Emergency Certification with full awareness that the process is not to be used lightly. Unfortunately, there are no other procedures that would allow for planting the project area before the planting window closes in mid-April. However, again, if the Commission finds the proposed work to be objectionable or disagrees with the proposed risk and benefit assessment, SBPF will withdraw this request, and will not appeal an adverse decision.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven Cohen", written in a cursive style.

Steven Cohen  
Counsel to SBPF

**READE, GULLICKSEN,**

**HANLEY, GIFFORD & COHEN, LLP**

Enclosures:

- Geotube as-built plan, dated January 27, 2014 by Blackwell and Associates, Inc.
- Planting area cross-sections (within Malone and Macbroom November 5, 2013 NOI submission.
- Haley and Aldrich Memorandum of March 12, 2014, with referenced photographs
- March 14, 2014 Supplemental Information filing for March 19, 2014 NOI Hearing (without attachments).

cc: Mr. Jeffrey Carlson (Conservation Agent)  
Ms. Libby Gibson (Town Manager)  
Ms. Kara Buzanoski (Director of DPW)  
Mr. Robert DeCosta (Board of Selectmen)  
Mr. David Johnston (Deputy Regional Director DEP SERO)  
SBPF  
Epsilon Associates



# BAXTER ROAD TEMPORARY STABILIZATION NOI SUBMISSION

BAXTER ROAD  
NANTUCKET, MASSACHUSETTS

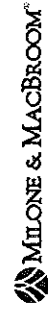
October 25, 2013  
REVISED: NOVEMBER 5, 2013



PROJECT SITE VICINITY MAP:

NOT TO SCALE

PREPARED BY:



1750 Second Street, Suite 102  
Nantucket, Massachusetts 01910  
Phone: 508.226.1111  
www.miloneandmacbroom.com



LOCATION MAP:

NOT TO SCALE

PREPARED FOR:  
TOWN OF NANTUCKET  
NANTUCKET, MASSACHUSETTS

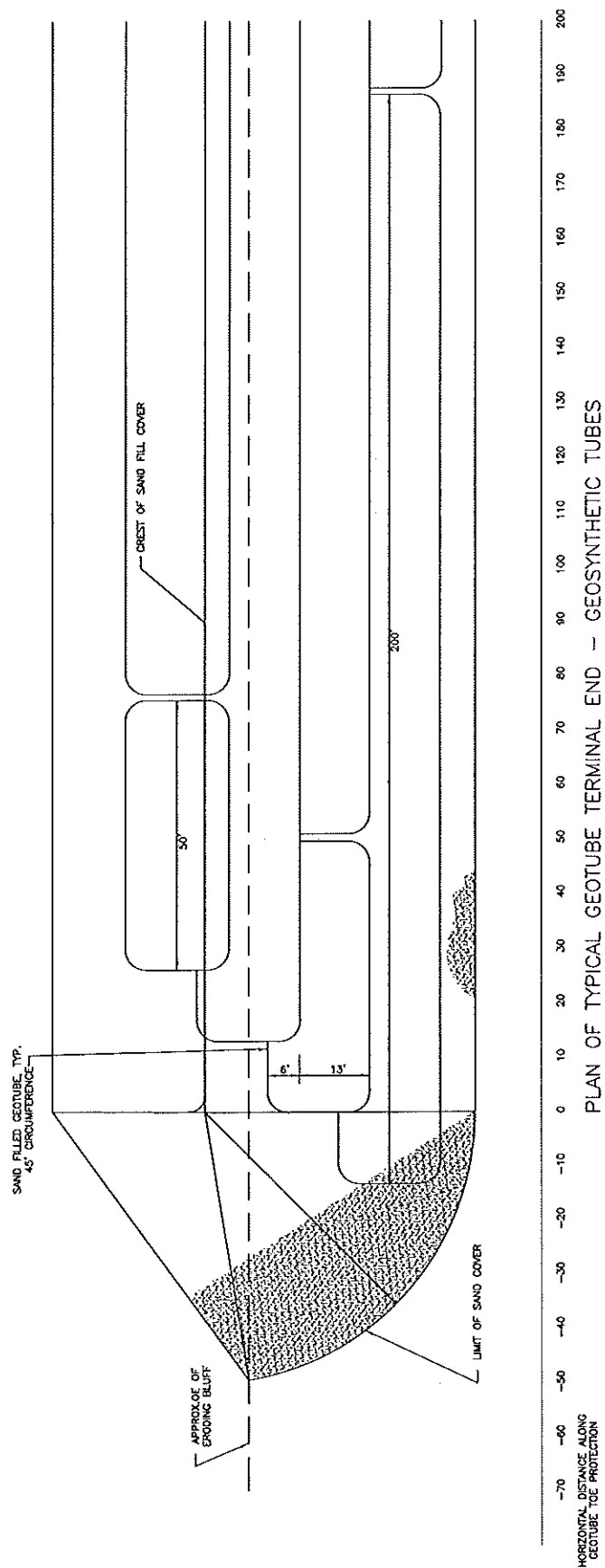
## LIST OF DRAWINGS

SHEET NO.	TITLE
1	TITLE SHEET
2	EXISTING CONDITIONS
3	GENERAL PLAN
4	TYPICAL CROSS SECTION
5	FLANKING DETAIL
6	CONSTRUCTION STAGING AREA
7-11	CROSS SECTIONS

DESIGNER: MILONE & MACBROOM, INC.  
BY: James MacBroom  
DATE: November 5, 2013  
P.L. NO. 43017

## SIX





**FOR PERMITTING PURPOSES ONLY**



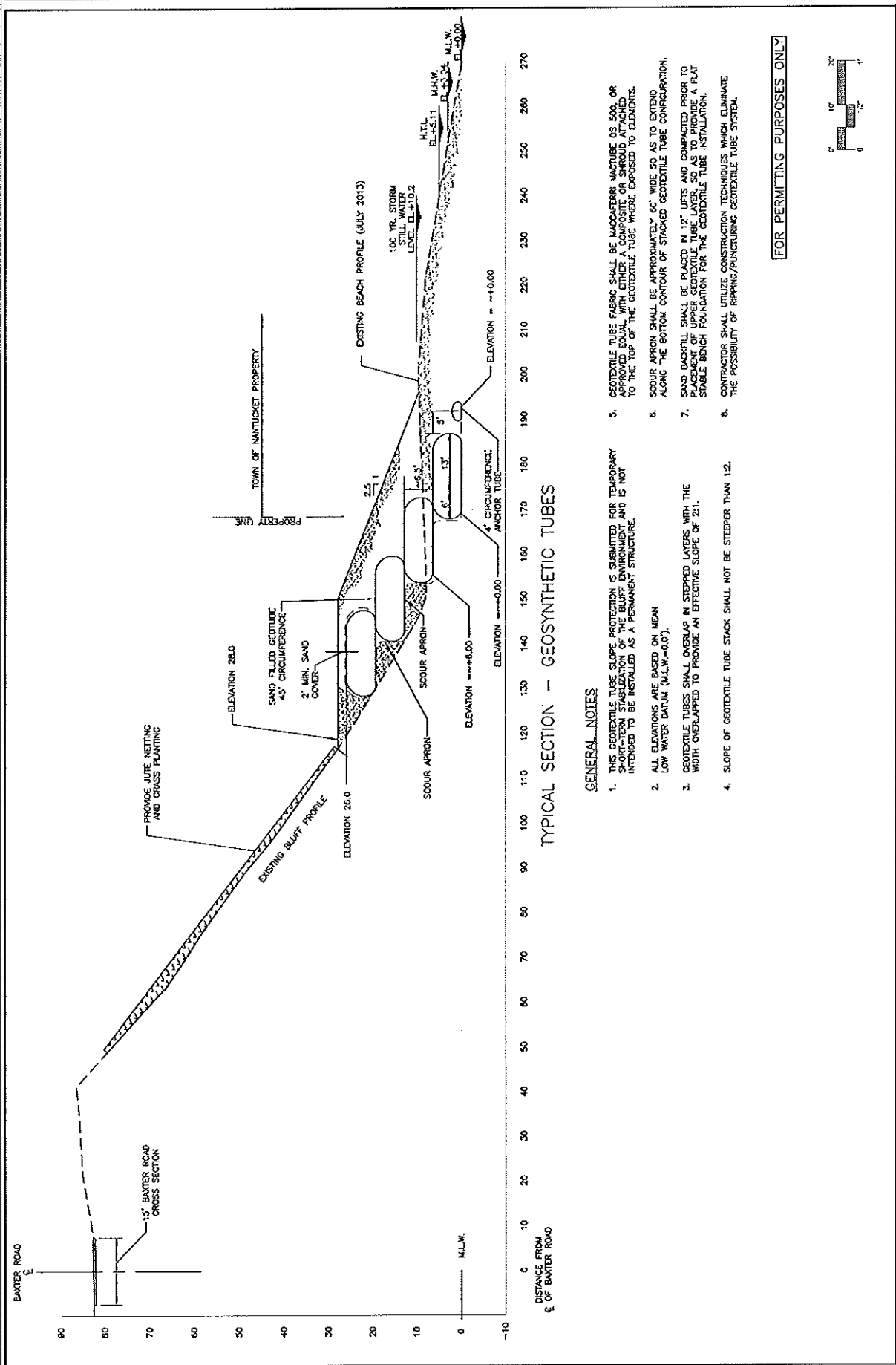
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BAXTER ROAD  
 SLOPE STABILIZATION  
 NANTUCKET, MASSACHUSETTS

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2	Design changes
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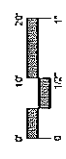


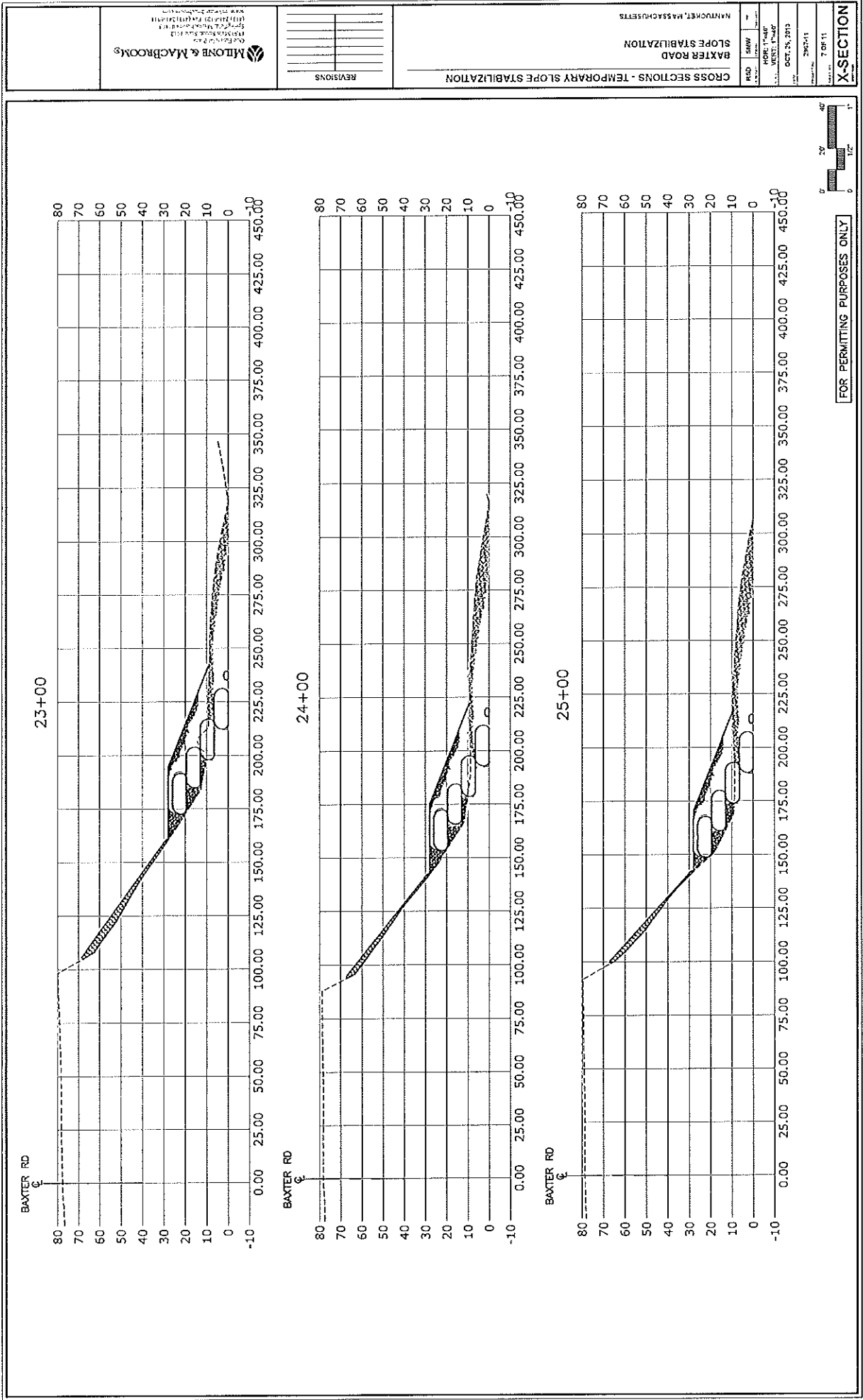
TYPICAL SECTION - GEOSYNTHETIC TUBES

GENERAL NOTES

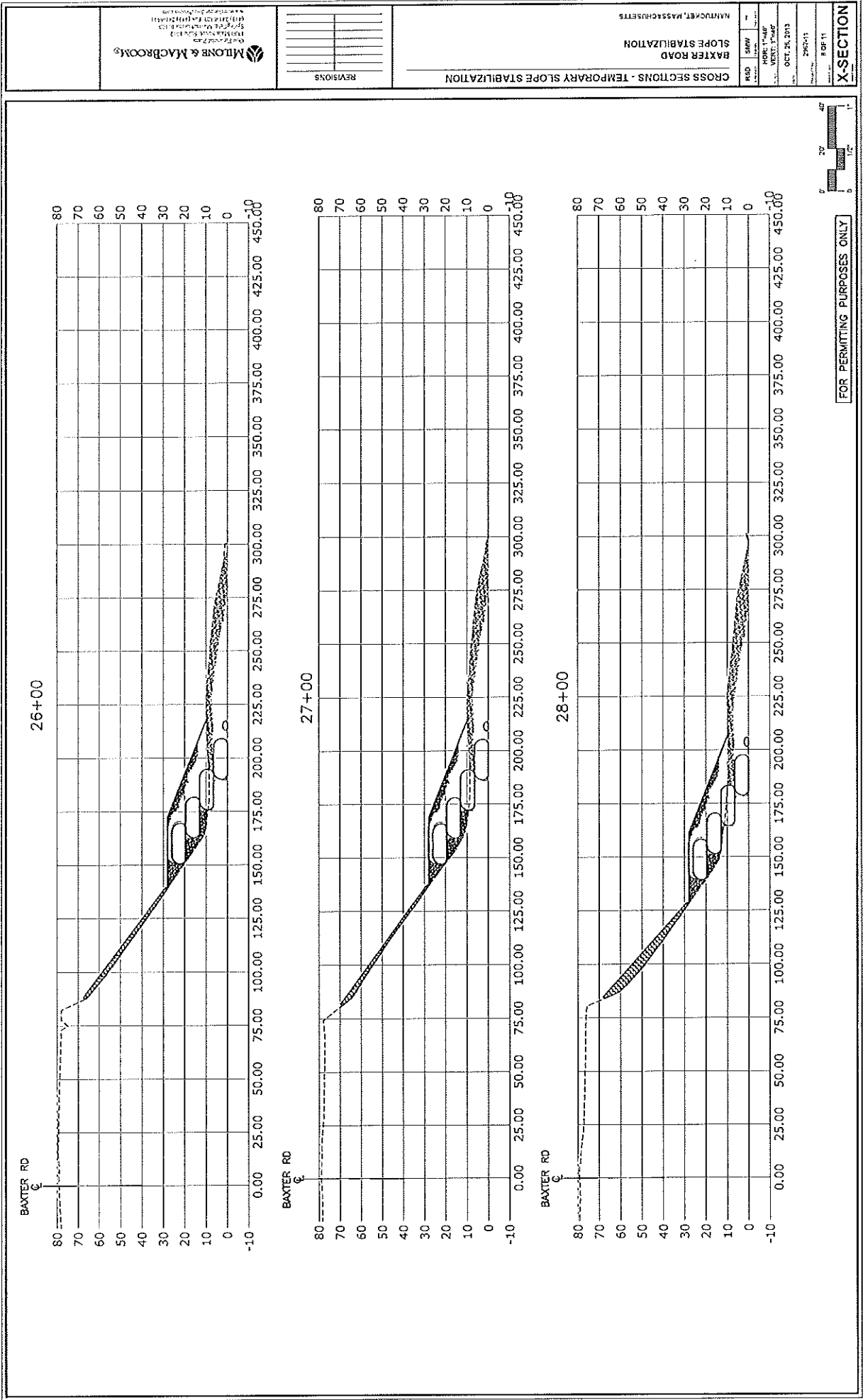
1. THIS GEOTEXTILE TUBE SLOPE PROTECTION IS SUBMITTED FOR TEMPORARY SHORT-TERM STABILIZATION OF THE BLUFF ENVIRONMENT AND IS NOT INTENDED TO BE INSTALLED AS A PERMANENT STRUCTURE.
2. ALL ELEVATIONS ARE BASED ON MEAN LOW WATER DATUM (M.L.W. = 0.0').
3. GEOTEXTILE TUBES SHALL OVERLAP IN STEPPED LAYERS WITH THE WIDTH OVERLAP TO PROVIDE AN EFFECTIVE SLOPE OF 2:1.
4. SLOPE OF GEOTEXTILE TUBE STACK SHALL NOT BE STEEPER THAN 1:2.
5. GEOTEXTILE TUBE FABRIC SHALL BE MACOFERRI W/ACTUBE OS 500 OR APPROVED EQUAL WITH OTHER A COMPOSITE OR SHROUD ATTACHED TO THE TOP OF THE GEOTEXTILE TUBE WHERE EXPOSED TO ELEMENTS.
6. SCOUR APRON SHALL BE APPROXIMATELY 60' WIDE 50' AS TO EXTEND ALONG THE BOTTOM CONTOUR OF SHAGGED GEOTEXTILE TUBE CONFIGURATION.
7. SAND BACKFILL SHALL BE PLACED IN 12" LIFTS AND COMPACTED PRIOR TO PLACEMENT OF UPPER GEOTEXTILE TUBE LAYER, 50' AS TO PROVIDE A FLAT STABLE BENCH FOUNDATION FOR THE GEOTEXTILE TUBE INSTALLATION.
8. CONTRACTOR SHALL UTILIZE CONSTRUCTION TECHNIQUES WHICH ELIMINATE THE POSSIBILITY OF RIPPING/FUNCTURING GEOTEXTILE TUBE SYSTEM.


FOR PERMITTING PURPOSES ONLY





MILONE & MACBROOM  
1000 Main Street  
Springfield, MA 01103  
www.milone-macbroom.com

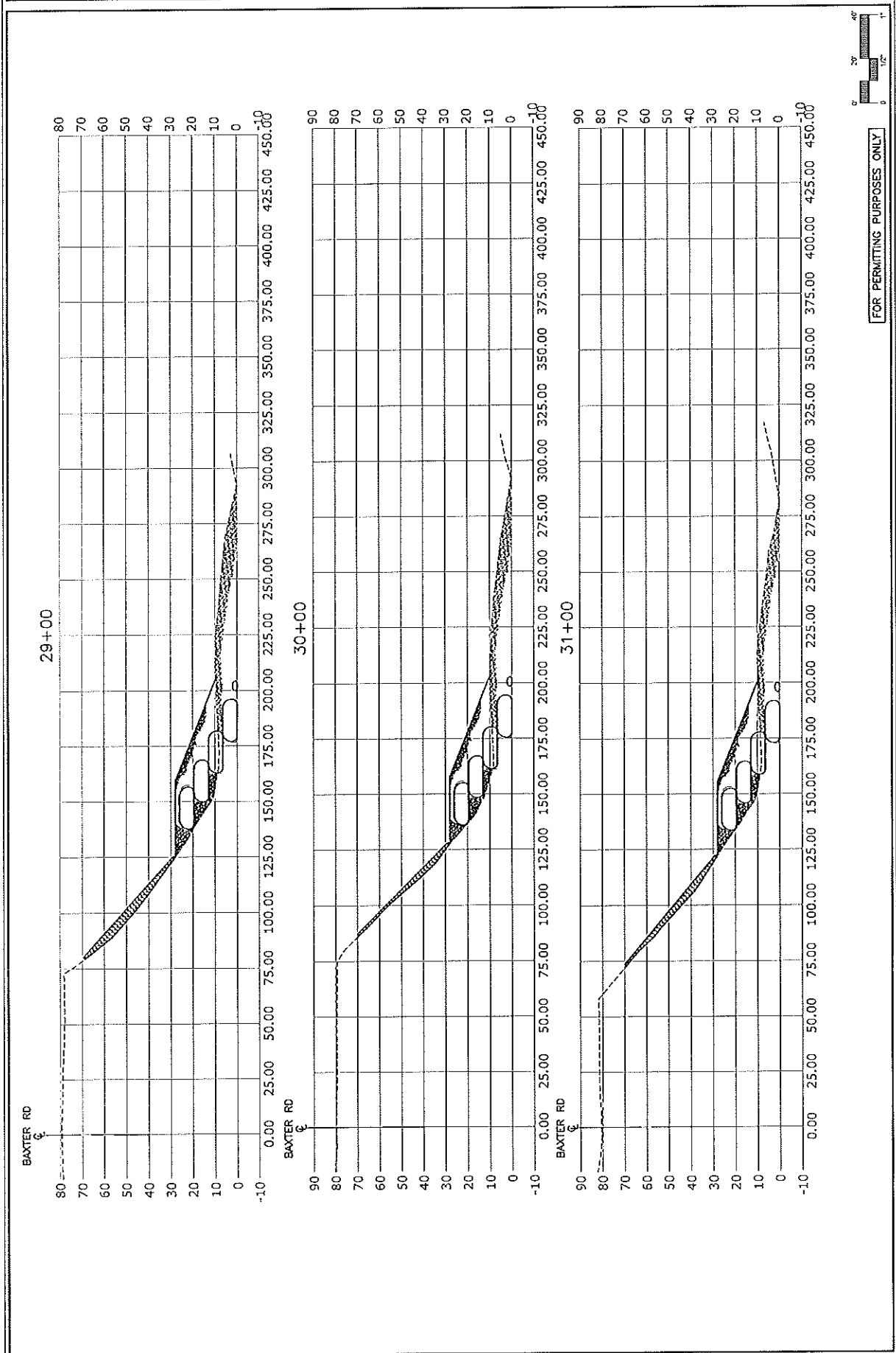



**MILON & MACBROOK**  
 ENGINEERS & ARCHITECTS  
 100 STATE STREET, SUITE 200  
 NANTUCKET, MASSACHUSETTS 02551  
 TEL: 508/225-1111 FAX: 508/225-1112  
 WWW.MILONMACBROOK.COM

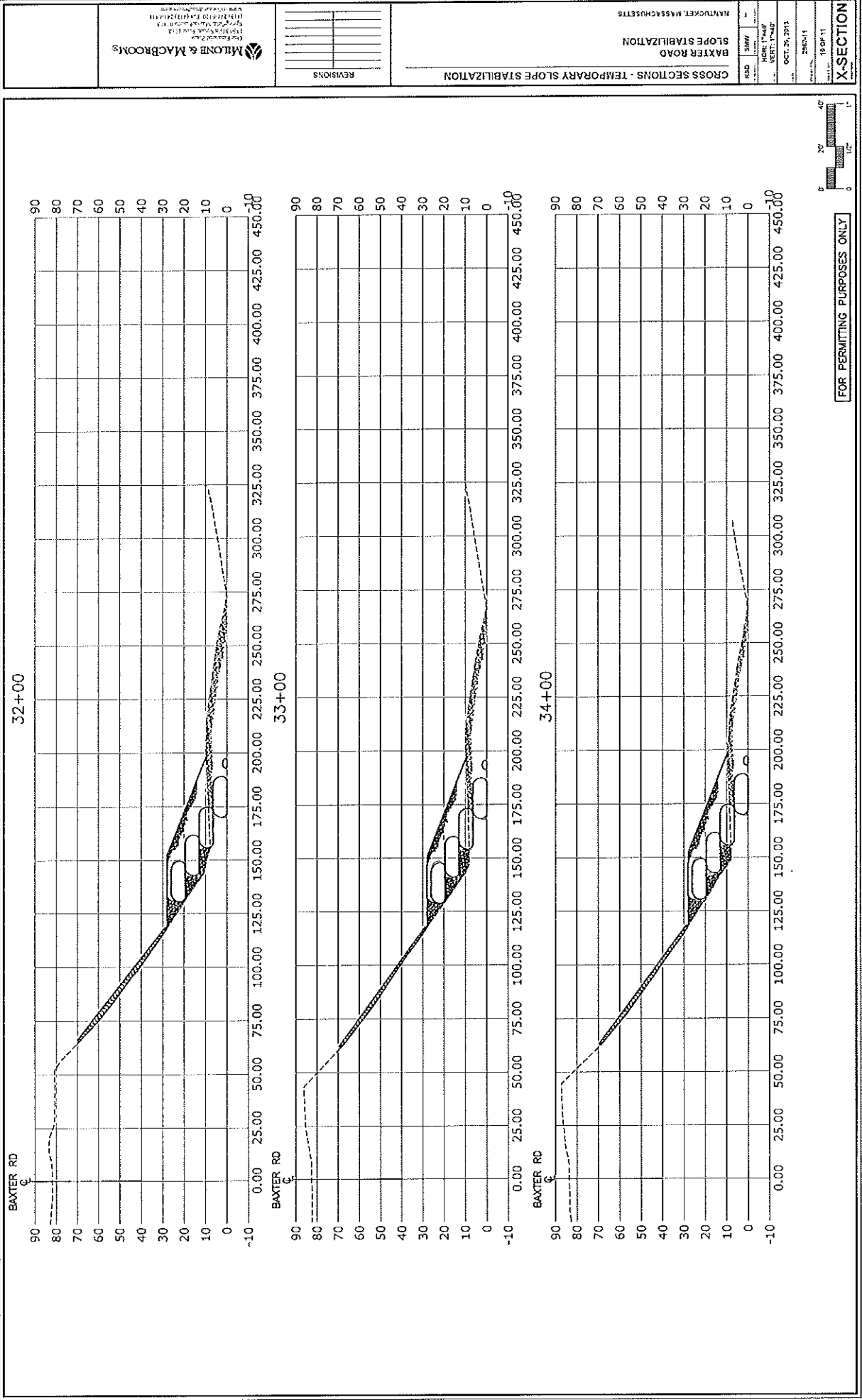
REVISIONS

**CROSS SECTIONS - TEMPORARY SLOPE STABILIZATION**  
**BAXTER ROAD**  
**SLOPE STABILIZATION**  
 NANTUCKET, MASSACHUSETTS

SHEET NO. 1 OF 1  
 DATE: OCT. 26, 2013  
 PROJECT: 2007-11  
 DRAWN BY: R. OF 11  
**X-SECTION**



FOR PERMITTING PURPOSES ONLY



FOR PERMITTING PURPOSES ONLY

X-SECTION

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Haley & Aldrich, Inc.  
465 Medford St.  
Suite 2200  
Boston, MA 02129



Tel: 617.886.7400  
Fax: 617.886.7600  
HaleyAldrich.com

## MEMORANDUM

12 March 2014  
File No. 26694-300

TO: Sconset Beach Preservation Fund  
Epsilon Associates  
Les Smith

FROM: Haley & Aldrich, Inc.  
Mark X. Haley, P.E.

SUBJECT: Sconset Beach  
Recommendations to Increase Bluff Stability

This memo has been prepared to present recommendations to increase bluff stability at the Sconset Bluffs adjacent to Baxter Road. While a portion of the toe of the bluff (Lot 87 to 105) has been protected by the geotube installation, additional measures are recommended to address the potential for ongoing erosion of the face and especially the top of the bluff due to surface water runoff and the potential collapse of the near-vertical sections at the top of the slope. If not addressed, ongoing erosion and slumping can reasonably be expected to result in further losses to the top of the bluff that may threaten Baxter Road and associated utilities or certain homes. The toe protection addresses the major source of erosion; however, leaving the face of the bluff unprotected leaves a lesser but still critically important element unaddressed.

Haley & Aldrich recommends protecting the face of the bluff as follows:

1. Install surface water drains along Baxter Road at selected locations. We recommend that discrete sub-surface drainage systems be installed perpendicular and potentially parallel to Baxter Road in selected locations to control water breakout on the face of slope causing further erosion. We recommend placement of a 4 inch diameter perforated pipe within a shallow narrow trench backfilled with crushed stone wrapped in filter fabric to collect and direct water to the slope face. To control water flow down the face of the bluff, a solid pipe down the face slope could be installed and direct water to the sand and beach area below. The location of these limited sub-surface drains would be selected based on observations following a significant rain event to identify where:

- a. ponding of water occurs at the edge of Baxter Road, and
- b. water breakout at the face of slope is observed

These elements are proposed to reduce the potential for bank erosion due to surface water run-off. The stone and pipe system will have no impact on subsurface water hydrogeology as the stone and pipe are located significantly above the ground water table. The system is to control the surface water and preclude impacts to the soils at the bluff face. This system is recommended specifically at Lot 91, and would also be beneficial at other locations where area topography is such that surface water runoff from Baxter Road is being directed across the property overland and towards the bluff.

Additional backfill is also recommended specific to Lot 91, where a gully has historically been present. The location of the gully has always been slightly lower in elevation than the surrounding land and is believed to potentially be an old surface water drainage channel primarily from Baxter Road. The gully should be backfilled and the backfill material placed should continue to allow surface water to flow from Baxter Road out to the bluff, using the surface water drain described above.

2. "Augment" the face of the bluff by placing additional sand above the geotubes. Adding sand to the face of the slope, especially near the top of slope where the slope is near vertical, will greatly increase the stability of the bluff. The additional sand will result in a shallower, more stable slope angle that will decrease the likelihood of collapse of the over steepened upper portions of the bluff. Additional sand augmentation will also provide increased infiltration of rain and surface water runoff and attenuate soil erosion from rain and surface water flows (Refer to Photo 1). Such augmentation can be beneficial anywhere in the project area from 87-105 Baxter Road where the upper bluff is near vertical or where the bank soils provide poor drainage, and could be prioritized in those areas where Baxter Road or homes are most threatened.

With the onset of spring and significant rain events, as experienced during the past few years, "sand augmentation" should be a priority especially where structures are close to the Bluff or where the distance to Baxter Road is less than 35 to 40 feet.

3. Plant the face of the bluff with beach grass and native shrubs. We recommend a planting program of beach grass and native shrubs be implemented, which will restore the slope to its "native state" and increase face stability and reduce erosion of the slope above the geotubes due to rain events. The use of a biodegradable netting and/or erosion control fabric is also recommended. In those areas where the face of the bank is uneven (which appears to be over much of the project area from 87-105 Baxter Road), placement of additional sand and slope grading is recommended to create a uniform surface of the slope and allow plantings.

As with the augmentation, vegetation should be a priority this spring.



*Image courtesy of George Riethof and the 'Sconset Trust*

Baxter Road Geotube Project Nantucket, MA

**Epsilon**  
CONSTRUCTION

Photographs 1-2  
 Sconset Bluff – Upper Bank Erosion



Baxter Road Geotube Project Nantucket, MA



*Image obtained from the Facebook page of the Nantucket Coastal Conservancy*

## AMERICAN BEACHGRASS

*Ammophila breviligulata* Fern.  
Plant Symbol = AMBR

Contributed By: USDA NRCS New Jersey State  
Office and the National Plant Data Center



Hitchcock (1951)

### Alternate Names

coastal beachgrass, beach grass, marram grass

### Uses

**Dune Stabilization:** Major use is to stabilize moving sand along the Atlantic seacoast and Great Lakes region. It is the best species for the initial stabilization of frontal dunes.

**Revegetation:** Useful as an erosion control plant on non-dune areas where soils are very sandy or inherently droughty and the site conditions make establishment of seeded species very difficult. In this application, the beachgrass may only survive a few years, but it plays a valuable role in jump-starting

plant succession. Also used on soils high in salinity, such as industrial waste needing vegetative cover.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state status and wetland indicator values.

### Description

**General:** Grass Family (Poaceae). American beachgrass, is a leafy, spreading, rhizomatous, native, bunch grass with many stems per clump. It may reach a height of two to three feet. The seed head is a spike-like panicle, about ten inches long, and appears in late July or August. Leaves are long and narrow, and may become rolled or folded as it matures.

One outstanding growth characteristic is the strong underground stems (rhizomes) that spread beneath the sand and give rise to many new plants. Its vigorous growth enables the plant to withstand heavy deposits of sand and grow up through it.

### Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

### Establishment

**Adaptation:** It is native to the mid-Atlantic coastal region from Maine to North Carolina, and the Great Lakes region. It will grow on inland sites, high in sand and/or saline content, provided applications of fertilizers containing nitrogen are made. Requires a sunny position in a light, well-drained soil and is very tolerant of severe maritime exposure. The plant has a deep, strong and extensively creeping rhizome, and can become invasive when growing in suitable conditions. This ability to colonize makes this grass very valuable for dune stabilization.

**Planting:** The best time to plant beach grass is from October 1 to March 30 in the Mid-Atlantic region, but may be extended to April 30 in New England in most seasons. If properly planted, good survival can be expected at any time during this period, except when soil is frozen. Summer plantings are not satisfactory.

American beachgrass can be planted either by hand or by mechanical equipment designed for this work.

Plant Materials <<http://plant-materials.nrcs.usda.gov/>>

Plant Fact Sheet/Guide Coordination Page <<http://plant-materials.nrcs.usda.gov/intranet/pfs.html>>

National Plant Data Center <<http://npdc.usda.gov>>

The stems of plants (culms) are used for planting stock. Two to three culms are planted per hole. Space plants 18" by 18" unless wind erosion is severe, then spacing is reduced to 12" by 12". Stagger the plantings in alternate rows to provide maximum erosion control. On very stable areas where wind is not a factor, a spacing of 24" by 24" is suitable. An 18" by 18" spacing requires 58,500 culms per acre, or 1,350 culms per 1,000 square feet.

Beachgrass culms must be planted at least 8" deep. This prevents plants from drying out, as well as being blown out by the wind. A tiling or ditching spade is an excellent tool for opening the planting hole. The culms and roots must be kept moist before and during planting. Success of planting will increase if the stock is dormant or has made very little growth.

Fertilizer properly applied is the key to good vigorous growth, as coastal sands are rather infertile. Apply fertilizer 30 days after planting, but no earlier than April 1 in the Mid-Atlantic and May 1 in New England. Inorganic, granular fertilizers high in nitrogen are best, if available (N-P-K analysis of 30-10-0, 16-8-8 or 10-10-10). Split the fertilizer applications: One in spring, another early summer, and a third in late summer, only in the establishment year. Apply no more than 1 lb. of N/1000 sq. ft. in a single application.

#### Management

Once the stand is well established, the rate of fertilizer applied can be reduced by half, or applied only when the stand appears to be weakening, based on local soil test results. Pedestrian and vehicular traffic that bends or breaks the culms will seriously damage the plants and may kill them if traffic is intensive.

**Cultivars, Improved and Selected Materials**  
[Vegetative culms] of 'Cape' and 'Hatteras' are commercially available, though seed is not available.

'Cape' is the most recent variety and was developed by the Natural Resources Conservation Service [*in 1970*] at the Cape May Plant Materials Center, Cape May Court House, New Jersey. Material for this release was collected in Barnstable County, Massachusetts. It is very vigorous, a heavy culm producer with leaves exceptionally broad, and spreads rapidly by rhizomes.

'Hatteras' was developed by the North Carolina Agricultural Experiment Station and is better adapted to southern climates. Hatteras was developed from a

collection of 18 clones screened for vigor and rate of spread. This cultivar is characterized by early vigor.

#### References

Alderson, J. & C. Sharp 1994. *Grass varieties in the United States*. Agriculture Handbook No. 170. USDA, Soil Conservation Service, Washington, D.C. 296 pp.

Gleason, H.A. & A. Cronquist 1991. *Manual of vascular plants of northeastern United States and adjacent Canada*. The New York Botanical Garden, Bronx, New York. 910 pp.

Hitchcock, A.S. 1951. *Manual of the grasses of the United States*. Miscellaneous Publication No. 200. USDA, Washington, D.C. 1051 pp.

Radford, A.E., H.E. Ahles, & C.R. Bell 1968. *Manual of the vascular flora of the Carolinas*. The university of North Carolina Press, Chapel Hill, North Carolina. 1183

Selisker, D.M. 1995. *Coastal dune restoration: A strategy for alleviating dieout of *Ammophila breviligulata**. Restoration Ecology 3(1):54-60.

Seymour, F.C. 1993. *The flora of New England*. Privately printed. 611 pp.

#### Prepared By

Chris Miller

USDA, NRCS, New Jersey State Office

J. Scott Peterson

USDA NRCS National Plant Data Center, Baton Rouge, Louisiana

#### Species Coordinator

Chris Miller

USDA, NRCS, New Jersey State Office, Somerset, New Jersey

Edited 05dec00 jsp;07feb03ahv; 30may06jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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*To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.*

*Read about Civil Rights at the Natural Resources Conservation Service.*

**BAXTER ROAD TEMPORARY STABILIZATION PROJECT  
NOTICE OF INTENT (DEP FILE NO. SE 048-2610)**

**SUPPLEMENTAL INFORMATION FOR MARCH 19, 2014 HEARING  
March 14, 2014**

**1. Geotube Information**

---

**A. Proposed Fourth Tier of Geotextile Material**

*SPBF and TON request that the Commission approve a fourth tier of geotextile material to complete the existing system.*

The engineering criteria used to design the geotube project (such as water level heights, anticipated wave runup, scour, etc.) are set forth in the attached memo from Ocean and Coastal Consultants (OCC) dated December 6, 2013 and submitted to the Commission as part of the Emergency Certification application filed on December 17, 2013. These design criteria clearly demonstrate the need for protection of the coastal bank up to elevation 24.2 Mean Low Water (MLW). Standard geotube dimensions put the top elevation at +26 ft MLW

As shown on the attached As-Built plan, the current 3-tier geotube system extends to elevation ~21 MLW and is not considered adequate for the coastal environment at Sconset. A fourth tier of protection is required to achieve the design elevation of +26 MLW.

The recommended material for the fourth tier is geotextile tubes. Understanding that the Commission wanted to evaluate the use of biodegradable materials (coir and/or jute), OCC has further analyzed the use of jute or coir to form the upper (fourth) tier of protection. The analysis performed by OCC in the attached memo dated March 13, 2014 demonstrates that a fourth tier made out of coir and/or jute will be expected to fail during the design storm event, leaving the coastal bank vulnerable at the time when protection is most critically needed. Additionally, as further described in OCC's memo, the required sacrificial sand volume of 22 cy/lf requires the use of a bulldozer and/or excavator perched on the top row of protection to spread the sand dumped over the top of the bank by the conveyor belts<sup>1</sup>. OCC's analysis indicates that the use of jute and/or coir for the top layer risks not being able to withstand the equipment loading and shear stresses caused by the tracks operating on the jute and/or coir, potentially causing the biodegradable material to fail under the weight of the equipment as sand is moved to cover areas of the template exposed by wave action.. For all these reasons, OCC does not recommend the use of jute and/or coir for the fourth tier of protection. Similarly, the use

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<sup>1</sup> Maintenance of the terraces requires the use of a much lighter skid steer; however, a skid steer is simply not adequate for the additional length and volume of the geotube project.

of jute and/or coir for the third tier of protection is even more certain to result in failure and will cause serious difficulties in sand delivery; therefore, the use of jute/coir for the third tier is not considered a feasible option.

Experience with the terraces suggests that biodegradable materials (jute and/or coir) may require complete replacement 1-3 times each year. This will require more frequent use of equipment at the top and toe of the bluff for sand delivery. Likewise, any sand contribution volume provided by complete emptying of two 15-foot circumference biodegradable tubes would be minimal, on the order of approximately 1 cy/lf. Biodegradable materials are not recommended given their clear engineering and feasibility drawbacks, as well as their minimal sand contribution.

Further, the state Department of Environmental Protection (DEP) approved an Emergency Certification request for the four geotube design (see attached cover letter and Order of Conditions). In its cover letter dated December 10, 2013, DEP states the following:

“The Department also applied the criterion at 310 CMR 10.30(3), which provides that a coastal engineering structure ‘shall be permitted’ to protect homes constructed prior to 1978 from storm damage. This regulation creates an exception to the general rule that precludes the installation of hard armoring of coastal banks. Based on the facts presented in the Request, this exception applies to the homes identified in the area subject to the determination of an emergency....

“The Department concludes that the [four tube] design of the coastal structure proposed in the Request does not go farther than necessary to protect these homes and essential public infrastructure serving the homes. In making this determination, the Department considered the specific facts presented by the proponents, including, without limitation, the proximity of the homes and infrastructure to the edge of the coastal bank, the ability of the four Geotubes to withstand a significant storm event and the threat posed by successive storm events....

“The implementation of the nourishment plan will mitigate any potential difference in down drift impacts between the four Geotube design and the hybrid design approved in the Town's Certification.”

## **B. Proposed Returns for Geotube**

*SBPF and TON request that the Commission approve the installation of returns at the ends of the system.*

The use of returns is critical to protect the geotube system from flanking and end scour over the long-term. SBPF proposes the use of 15-foot circumference geotextile tubes as shown on the attached plan, installed at shallow angle between the face of the seaward geotubes and the face of the unprotected bluff. Geotextile material is strongly preferred because it can better withstand the coastal conditions at Sconset than biodegradable material (as described under 1A).

## **C. Revised Location and Length of Geotubes**

*SBPF and TON are informing the Commission of the reduction in length of the installed system.*

The Emergency Certification approved a length of just under 900 feet long from 91-105 Baxter Road. The as-built geotube structure is approximately 852 feet long<sup>2</sup> from 87-105 Baxter Road. The presence of the clay head at 105 Baxter Road dictated that the geotube structure should not be installed farther to the north (or else excavation into the bluff would have been required), so the installation was shifted slightly to the south. The multiple geotubes installed along the same tier also overlap one another slightly at each end, leading to a slight reduction in overall length (to 852 feet) from the permitted dimension of just under 900 feet. Each return is approximately 21-feet long (as shown on the attached plan). Once the returns are installed, the total installed length will be approximately 900 feet. The project does not intend to proceed farther north than currently built, due to the presence of the clay head that would require excavation into the coastal bank. Similarly, the project does not intend to proceed farther south. Therefore, the final project length will be less than the 1500-feet originally proposed.

## **D. Construction Information**

*SPBF and TON are providing additional details on construction.*

- Sand Delivery. Sand delivery occurred at the delivery locations at 87 Baxter Road and 99/101 Baxter Road. These two locations will continue to be used for ongoing sand cover maintenance.
- Geotube Fill Port Closure. As detailed in the letter from SBPF dated February 12, 2014, the use of a small amount of concrete was required to seal the fill ports in the geotubes. The installer has confirmed via email of February 12, 2014 (previously submitted to the Commission) that this approach is standard procedure.

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<sup>2</sup> The as-built plan shows that the first and second geotubes are 852± feet long. The third (upper) geotube is 835± feet long.

Approximately one-third or less of a bag of concrete was used at each fill port. The size has been compared to a deflated soccer ball.

- US Army Corps of Engineers (USACE) Jurisdiction. Concern has been expressed about whether work was carried out below the High Tide Line. SBPF submitted information to the USACE at the end of December 2013 relating to the concern. Subsequent to the letter issued by the USACE in February 2013, SBPF again engaged with the USACE concerning its written inquiry of possible work below the High Tide Line. As indicated in the exchange with the USACE, the HTL was staked on the beach at the beginning of construction. The construction crew was aware of the HTL location on the beach and made every effort to stay landward of that line. The USACE informed SBPF that no further action is needed or planned and that no Federal order or violation notice has been issued or is planned. As we understand it, the USACE considers the matter of the geotube construction to be closed. However, to be safe, SBPF has provided the USACE with details on how future maintenance and sacrificial sand will be done to make sure that the USACE does not have any concerns with those future actions. Attached please find the original December 2013 update to the USACE regarding the geotube installation, which they acknowledge that they received and then misplaced, contributing to the inquiry, as well as Epsilon's February 26, 2014 summation letter after the later discussions.

## **2. Stormwater Drainage**

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*SBPF requests that the Commission permit the installation of a stormwater drain along 91 Baxter Road.*

Surface water runoff at 91 Baxter Road was contributing to significant erosion of the bank face. . The advising geotechnical engineer, Mark Haley of Haley & Aldrich, a well-respected geotechnical engineering firm with substantial experience on the Sconset Bluff, suggested that a subsurface drainage system be installed to direct the surface water runoff to the toe of the bank, rather than allowing it to break out on the bank face and cause additional erosion. A memo from Mark Haley dated March 12, 2014 describing his recommendations is attached.

The subsurface drain was installed at 91 Baxter Road, parallel to and approximately 10 feet seaward of the roadway, for a distance of approximately 41 feet. The subsurface drain consists of an 18 inch deep x 18 inch wide trough that is lined with filter fabric and holds a 4" diameter corrugated pipe. The trough is backfilled with ¾ inch gravel. The subsurface drain collects stormwater runoff and directs it to another 4" diameter PVC pipe that runs down the face of the bank and terminates at the toe of the bluff, in a gravel trough placed in the sand template behind the geotubes. No excavation into the bank or beach occurred to install the PVC pipe that runs down the face of the bank; this pipe was placed within sand added to the bank face or the sand template on the geotubes.

Although the pipe was installed because of construction timing, it was understood to require approval from the Commission before it was completed. The pipe was never connected and is not functioning. SBPF is requesting approval for the subsurface drain.

### **3. Bluff Protection through Re-vegetation**

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*SBPF and TON request approval to vegetate the upper bank, including smoothing or dressing the bank face to create an acceptable planting bed and using an erosion control fabric or biodegradable netting.*

The upper portion of 'Sconset bluff (above the geotube installation at 87-105 Baxter Road) exhibits evidence of rill erosion from rainfall and stormwater runoff from the top of the coastal bank. The attached Photographs 1-4 show the development of rivulets and small gullies in the bank face. While the geotubes have served to protect the toe of the coastal bank from waves and storm surges, erosion of the upper bank due to runoff over the bank surface and slumping due to gravity mass failure will likely continue unless additional measures are undertaken to protect this bank area. See attached memo from Mark Haley dated March 12, 2014, on the need for vegetation of the bank face.

It is critical to address this upper bank erosion within the project area, as the loss of even a few feet of bank leaves Baxter Road potentially vulnerable to closure. As was previously submitted to the Commission, Mark Haley recommends a minimum distance of 25-feet be maintained between the edge of pavement and top of the bluff. When the top of bluff is within 25 feet of the pavement edge, a detailed assessment should be completed by a geotechnical engineer and the possibility of the road being closed should be carefully considered. Field measurements and aerial surveys performed in summer 2013 indicate that the distance between the top of the bluff and the edge of Baxter Road is as close as 30 to 40 feet from the edge of Baxter Road in several areas, and is 60 to 70 feet away in many areas.

Subsequent discussions with Mark Haley and other erosion control professionals indicate that the most effective means of addressing the upper bank erosion will be through the planting of native vegetation with strong underground stems (rhizomes), such as American beachgrass, or other native vegetation with an extensive root system. (Bank "augmentation" is also beneficial; this is further discussed in #4C below.) To ensure vegetation efforts are successful, some addition of sand is needed to prepare the planting bed prior to planting. This sand will be provided from on-island sand pits by the conveyor belt system utilized during the geotube construction process. The use of a biodegradable erosion control fabric or jute netting is also proposed to protect soil from wind and water erosion, and retain moisture to facilitate establishment of vegetation. In his memo dated March 12, 2014, Mark Haley recommended the vegetation of the bluff and noted that it would "increase face stability and reduce erosion of the slope above the geotubes due to rain events."

The preferred type of vegetation for initial planting is American beachgrass; additional native vegetation (such as woody shrubs) may be planted subsequently. The USDA Natural Resource Conservation Service's (NRCS) Plant Guide for American beachgrass (attached) states that the optimal time to plant the bank face is **October 1 through March 30**, and that this period may be extended through April 30 in New England in most seasons. Discussions with two suppliers of American beachgrass to Nantucket confirm that the best possible time for planting beachgrass is **before mid-April**. Further, planting at this time allows the American beachgrass one full growing season for rhizome development and the associated benefit to bank stability, prior to the start of the winter storm season. Given how little bank loss can be tolerated in the project area before road closure is required, it is critical to protect the upper bank face from ongoing erosion by establishing vegetation this growing season. Finally, fertilizer applied on the schedule listed in the Plant Guide is strongly recommended by the NRCS as the key to vigorous growth. SBPF and TON propose to follow the fertilizer guidelines established by NRCS.

Based on discussions with two local companies, the preferred type of American beachgrass is referred to as "bare root." The "bare root" type must be planted by mid-April and will result in fuller plant and rhizome development by the fall. Use of the "bare root" type would provide substantial protection to the upper bank by the end of the 2014 growing season. The less preferred option is the "root ball" type, which can be planted after mid-April but would require two growing seasons to develop as fully as the "bare root" type, meaning that the upper bluff would only have marginal protection until the end of the 2015 growing season.

Within the project area, the planting of vegetation will occur entirely on private property. The establishment of vegetation not only stabilizes the coastal bank, but also contributes to wetland scenic view and wildlife habitat with no negative impacts. It is clear from the planting of beach grass in other locations on the bluff in recent years that this vegetation will be successful in stabilizing the face of the bluff and encouraging infiltration (instead of run-off and erosion), now that the toe has been protected and the vegetation will not be undermined.

#### **4. Sand Contributions, including Sand Volumes (for construction and sacrificial template), Schedule of Future Contributions/Maintenance, and Bluff Face Augmentation.**

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##### **A. Sand Volume Delivered During Construction**

*SBPF and TON are presenting documentation that the required volume of sand was provided.*

The attached Table 1. "Summary of Sand Delivery Requirements for 'Sconset Geotube Project, 87-105 Baxter Road, Nantucket, MA" demonstrates that the project met its sand delivery requirements. The volume of sand required to construct the geotubes (sand fill required in the tubes, sand fill required behind the tubes to create the "benches," sand for the 22 cy/lf sand cover) totals 31,396.50 cy. The sand delivered was in excess of this requirement at 39,204.24 cy. The 7,807.74 cy of surplus sand was used at the sand delivery locations, on the face of the bluff, at the ends, for construction, etc. The attached Table 2. "Record of Individual Truck Deliveries for 'Sconset Geotube Project, 87-105 Baxter Road, Nantucket, MA" provides a detailed inventory of individual truck deliveries, including invoices and receipts.

##### **B. Sand Maintenance Plan and Delivery Schedule.**

*SBPF and TON are presenting information on the volume and delivery schedule for the sand cover.*

Considerable documentation has been previously provided that the average annual volume of bank erosion is equivalent to 14.3 cy/lf/yr (see November 1, 2013 submission). SBPF and TON will accept a sand mitigation requirement of 22 cy/lf/yr, in accordance with the recommendation from the DEP that additional sand be contributed for now, based on its finding that: "The implementation of the nourishment plan will mitigate any potential difference in down drift impacts between the four Geotube design and the hybrid design approved in the Town's Certification. " (See attached December 10, 2013 cover letter from DEP.)

The 22 cubic yards per linear ft (cy/lf) of sand will be delivered in accordance with the following schedule:

- Provide the initial cover of 22 cy/lf during and/or immediately following construction.
- Annually in April starting in 2014: Provide additional sand and/or adjust the existing template sand to obtain a minimum of 2 feet of cover over the geotubes to protect them from UV degradation. If some portion of the previous year's sand is in place at the time of April nourishment, then only that volume needed to provide the 2 feet of cover will be added. The volume of any sand placed in April will be recorded and counted towards the annual 22 cy/lf requirement.

- Annually in November starting in 2014: Place an additional 10-15 cy/lf of sand, to ensure a substantial portion of the sand template volume is available at the onset of the winter storm season. Throughout the winter, place additional sand on an as-needed basis, in accordance with the replenishment trigger presented in our November 12, 2013 letter (i.e., if half the vertical height of the lowest geotube is exposed, place a minimum of 2 cy/lf). If the balance of the 22 cy/lf volume is not placed in its entirety during the 2014-2015 winter, the balance of the sand will be placed by March 31, 2015.
- Delivery tickets from sand suppliers will be provided to the Conservation Commission to document the total volume of sand provided on an annual basis (April 1- March 31 of any given year).

The attached Tables 1 and 2 provide, respectively, a summary of how the project met its sand delivery requirements as well as a detailed inventory of individual truck deliveries and receipts.

### C. Bluff Augmentation

*SBPF and TON are requesting approval of bluff augmentation to further stabilize the bluff.*

As described above under #3, in the attached photographs, and in the memo from Mark Haley dated March 12, 2014, the existing coastal bank above the geotubes remains susceptible to erosion from rain and stormwater runoff. The bluff is particularly unstable in those portions that are over-steepened at the top, which are highly susceptible to further collapse, potentially leading to additional catastrophic losses at the top of the coastal bank. To address these issues, it is proposed to “augment” the existing coastal bank in the project area by adding compatible sand to the face of the coastal bank, via the same conveyor belt system used to provide the sand cover on the geotubes. Mark Haley of Haley & Aldrich, in his memo dated March 12, 2014, has indicated that: “Adding sand to the face of the slope, especially near the top of slope where the slope is near vertical, will greatly increase the stability of the bluff.”

During the construction process, additional sand was placed at or near the sand delivery locations at 87/91 and 99/101 Baxter Road (see attached Photograph 5). It has been observed that this sand acted to protect the face of the bluff because it increased infiltration of rain and surface water runoff and also attenuated soil erosion from rain and surface water flows. In the areas where the face of the bluff was not augmented with additional sand, surface water flows continued to erode that portion of the bluff above the geotubes.

SBPF and TON are requesting approval of the existing bluff augmentation now in place at or near the two sand delivery locations (87/91 and 99/101 Baxter Road), as well as the proposed added augmentation at 93 Baxter Road, where the existing pre-1978 dwelling is

less than 8 feet from the top of bank and is in imminent danger. Immediate bluff augmentation efforts at 93 Baxter Road, combined with vegetation, could stabilize the entire bluff and prevent the loss of this pre-1978 structure. We note that adding this sand has no negative effect: it is bank- and beach- compatible and will either remain in place or run down to the geotube template or the beach for contribution to the littoral system.

#### **List of Attachments**

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1. Memo from Ocean and Coastal Consultants, dated March 13, 2014
2. DEP Emergency Certification Approval (cover letter and Order of Conditions), dated December 10, 2013
3. Plan and Isometric View of Returns
4. USACE Correspondence (emails from Epsilon to USACE dated December 27 and 30, 2013 and letter from Epsilon dated February 26, 2014)
5. Memo from Mark Haley dated March 12, 2014
6. Photographs 1-5 of Sconset Bluff
7. Natural Resource Conservation Service's Plant Guide for American beachgrass
8. Table 1. "Summary of Sand Delivery Requirements for 'Sconset Geotube Project, 87-105 Baxter Road, Nantucket, MA"
9. Table 2. "Record of Individual Truck Deliveries for 'Sconset Geotube Project, 87-105 Baxter Road, Nantucket, MA"
10. Response to Nantucket Land Council Letter dated February 18, 2014
11. Approximate Sand Template